DOCUMENT RESUME

ED 348 876 FL 020 587

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TITLE Developing English CBI Programs at Doshisha University.
PUB DATE 92
NOTE 36p.
PUB TYPE Journal Articles (080)
JOURNAL CIT Doshisha Business Review; v43 n4 p137-70 Jan 1992

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS Budgeting; *Computer Assisted Instruction; Computers; Course Organization; *Courseware; Educational Facilities; Educational History; *English (Second Language); Foreign Countries; Grammar; Higher Education; Instructional Materials; *Material Development; Program Descriptions; Program Development; Reading Instruction; Second Language Instruction; Student Attitudes; Vocabulary Development; Writing Instruction
IDENTIFIERS *Doshisha University (Japan); Japan

ABSTRACT

Computer-assisted instruction (CAI) has been studied in Japan since about 1963. However, materials for computer-assisted English second language instruction at the college level are not highly developed. A 1985 experiment in CAI at one Japanese university used materials developed by faculty, staff, and students. Instruction using CAI at Doshisha University (Japan) began in 1986 with very limited facilities and time-sharing. Additional funding beginning in 1988 allowed development of facilities, training, and program development. The computer-based instruction (CBI) English grammar program opened in fall 1988 with a typing program and three classes. Commercial software was unavailable, but specialists were brought in to develop courseware. Currently, computers are used for instruction with words (not sounds or visuals), class administration, and individual assistance to students. The classes are gaining in popularity. English courses using CBI include, grammar, reading, writing, listening, and conversation. Students are offered an orientation to the computers. Teachers are trained and provided with instructor manuals. The system works with the Hitachi 2020 computer, which is not networked. The main program types used currently include typing, multiple-choice response, and write-in response. Four major computer-managed instruction programs have also been developed. Review of the materials and methods indicate strengths, potential, and areas for improvement. (MSE)

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同志社商学第43巻第4号　抜刷
1992年1月25日　発行

ED348876

Developing English CBI Programs at Doshisha University[1]

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U.S. DEPARTMENT OF EDUCATION
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Doshisha Business Review
Vol. 43, No. 4 (January 1992)
The Association of Commerce
Doshisha University
Karasuma Imadegawa
Kamigyo-ku, Kyoto 602
Japan

FL 020 587

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Developing English CBI Programs at Doshisha University[1]

Kenji Kitao

Introduction

As computers have rapidly become cheaper, more common and more sophisticated, they have also become more widely available in schools. Computer education will be required in junior high and senior high schools within the next few years. Teacher training includes computer training, and all colleges have to have computers for teacher training.

As more computers become available in schools, they have to be used for instruction itself, because they are too expensive to be used just for computer education courses such as courses training students in programming or teaching them how to use commercial software for office work. Therefore, computer assisted instruction (CAI) is becoming more and more important in schools.

In this paper I will briefly review the history of CAI in both the United States and Japan, and I will explain the English computer based instruction (CBI) materials which we have developed over

1 This study was carried out with assistance of Doshisha University Research Fund grants 1990 & 1991–1992, and Doshisha University Computer Research Fund grant, 1991.

the past four years and discuss their theoretical background. CBI includes CAI programs, which students use to assist them in studying; and computer managed instruction (CMI) programs, which grade students' answers, analyze the grades and times statistically and obtain the mean scores for the first trial and the second trial (and their percentages) and the mean time of the whole class. CMI programs also list the students' results in the order of their ID numbers, their scores and the time they required to finish. They can also do item analyses for multiple-choice questions, and list the errors of individual students on individual fill-in questions. They can sum up the results of files. These results can be used in assisting individual students. Though we have developed CBI only for English grammar, reading and writing so far, this system can be used for any subject, including other foreign languages and even classes offered in Japanese.

The History of CAI

In the United States

The history of the use of computers to assist teaching is long. Pressey (1926 & 1927) published papers on a machine which taught, tested and graded. Skinner (1954) published a paper on programmed instruction which formed the foundation for computer assisted instruction (CAI). The American navy realized that it was important to train new soldiers as quickly as possible using computers when they had to send them to the Suez Canal during the

crisis in 1956. With military assistance in the 1960s, CAI was developed by large institutions, including the University of Illinois, where PLATO I–V were developed. Many teaching materials were developed there and some were even exported. However, large computers were available only in a few large facilities such as universities or research institutes, and they were very expensive. Therefore not many people could use CAI in those days.

Americans have had a tendency to emphasize individualized instruction, which means instruction has to be suited to a student's abilities, goals, interests, and learning style. Instruction in American institutions is more individualized than in Japanese institutions. In the 1970s, individualized instruction in foreign languages, which varied goals, content, and pace according to the individual student's needs and abilities, was studied (Altman, 1972; Altman & Politzer, 1971; Disick, 1975; Grittner & Laleike, 1975; Lange, 1972; Logan, 1973). This increased the demand for foreign language CAI. Mini-computers and personal computers became available, and prices became low enough that their use had spread by the end of 1970s.

In the 1980s, personal computers became more widely available, and they were used more frequently in schools. Because of this, more progress was made in foreign language CAI, including English CAI for non-native speakers of English. At the 1983 TESOL Conference in Toronto, there were many presentations on CAI using commercial software and teacher-made software (Kitao, 1983), and the 1991 TESOL Conference had some presentations on multi-media CAI

using CD-Rom or laser disks (Kitao, 1991; Kitao & Kitao, 1991).

In Japan

CAI has been studied in Japan since about 1963 (Okamoto, 1988). CAI was done using large- and middle-size computers until 1980 (Okamoto, 1988). Computers and personal computers have been used in business, including CAI for training employees, much more than in schools. The quantity and quality of English CAI programs using personal computers have increased a great deal since 1985. I attended the CAI & Instructional Media Show in 1989 and 1991 and found that most of the visitors to the show were people involved in training in business, and only about 18% of the visitors were from schools, of whom the majority were computer education, science and mathematics teachers. There appears to be a trend in this show toward multi-media CAI which included words, pictures, photos, sound, and video using CD-Rom. My colleagues and I are convinced that the CAI used in schools will be multi-media CAI within a few years (Genma et al., 1992).

Some CAI materials for elementary schools, junior high schools and senior high schools were displayed at the show, but they were very primitive and were mainly drill oriented instruction. However, some multi-media CAI English materials were displayed, and I have heard that some new sophisticated English materials are being developed. Since English teaching materials for college students are more complex, CAI English materials for the college level are more difficult to make. Some college teachers have tried to develop some

CAI English materials for individualized instruction (Shimatani, 1991; Taira, 1987) and for the classroom (Harrison, 1986; Kobayashi et al., 1987.; Nishitani, 1988; Nozawa, 1990).

CBI at Doshisha University[2]

When I began using of the computer at Doshisha University in the late 1970s, the computer was not powerful or convenient. I

2 Information about the history of CBI at Doshisha University is available in the following publications.

Kitao, K. (1990, November 1). Computers aid study of English. *Daily Yomiuri*, p. 7.

Kitao, K. (1990). Eigo CAI no kaihatsu: Doshisha daigaku no baai (1) [Developing English CAI: At Doshisha University (1)]. *Sony LL Tsushin*, **156**, 8–11.

Kitao, K. (1991). Eigo CAI kurasu no kokoromi [A trial of English CAI classes]. *Gendai Eigo Kyoiku* [Modern English Teaching], **27**(9), 38–40.

Kitao, K. (1991). Eigo CAI no kaihatsu: Doshisha daigaku no baai (2) [Developing English CAI: At Doshisha University (2)]. *Sony LL Tsushin*, **157**, 8–11.

Kitao, K. (1991). Eigo CAI no kaihatsu: Doshisha daigaku no baai (3) [Developing English CAI: At Doshisha University (3)]. *Sony LL Tsushin*, **158**, 10–13.

Kitao, K. (1991). Eigo CAI no kaihatsu: Doshisha daigaku no baai (4) [Developing English CAI: At Doshisha University (4)]. *Sony LL Tsushin*, **159**, 6–9.

Kitao, K. (1991). Eigo CAI no kaihatsu: Doshisha daigaku no baai (5) [Developing English CAI: At Doshisha University (5)]. *Sony LL Tsushin*, **160**, 6–9.

Kitao, K. (1991). Eigo CAI no kaihatsu: Doshisha daigaku no baai (6) [Developing English CAI: At Doshisha University (6)]. *Sony LL Tsushin*, **161**, 8–11.

Kitao, K. (1991). Eigo CAI no kaihatsu: Doshisha daigaku no baai (7) [Developing English CAI: At Doshisha University (7)]. *Sony LL Tsushin*, **162**, 8–11.

Kitao, K. (1992). Eigo CAI no kaihatsu: Doshisha daigaku no baai (8) [Developing English CAI: At Doshisha University (8)]. *Sony LL Tsushin*, **163**, 6–9.

had to go to the computer center to punch computer cards and read them in myself. There were only about two staff members there, and they could not or would not assist me even when I had errors and did not understand what was wrong. In the early 1980s, the time sharing system (TTS) was adopted and at least one terminal was available in each building for research purposes. The computer has been replaced about every third year with a larger and more powerful one. The staff was increased and users could get unofficial assistance from some of them, even for programming. Until the late 1980s, the computer was used mainly by the School of Technology and school administration. Until that time, it was not used to assist students studying any subject.

Investigating CAI at Kanazawa Kogyo University

Since CBI and CAI were considered to be very important in education, four foreign languages faculty members were sent in 1985 to investigate English CAI at Kanazawa Kogyo University, which had the most advanced CAI using a host computer. Kanazawa Kogyo University had a large room with many computer terminals. Students could go there any time to study for basic courses or standardized English tests, such as STEP tests. All CAI materials were made by teams made up of English professors, computer programmers, staff members from academic affairs, and computer majors. A large budget was allocated for CAI projects. CAI was used for many other courses in addition to English. The university was preparing to begin using personal computers for CAI rather than

a host computer. Doshisha University did not have such facilities, personnel or money for CAI at that time.

The Time Sharing System

When the Tanabe campus opened in 1986, two TSS (time sharing system) rooms were provided for the future computer related education. They were divided by a movable wall and had 80 Hitachi 2020 terminals which were connected to a host computer. Those terminals can function as personal computers with 10 or 20 mega bite hard disks. In 1990, another room with 85 lap-top computers which are also connected to the same host computer opened to train students who take teacher training courses, since computer education became required in teacher training. These are not necessarily ideal facilities and equipment for CAI, but they made it possible to start using CAI, and the major problem of facilities and equipment was taken care of.

Budgeting for CBI[3]

In 1988, ¥5,000,000 (approximately $38,500) was budgeted to enhance education on the Tanabe campus, and ¥900,000 ($6900) was allocated to start English CBI classes. In 1989, ¥600,000 ($4600), and in 1990, ¥250,000 ($1900) was allocated for CBI from this fund. This was mainly for honoraria for programmers, and very little money was used to develop teaching materials for CBI.

3 Conversions to dollars are based on a rounded off exchange rate of $1 = ¥130 on November 29, 1991.

In 1990, the Doshisha University Research Fund became available and ¥600,000 ($4600) was allocated for materials, honoraria for developing teaching materials, training, traveling, equipment, stationary, books, software, postage, and presenting the results of research. From 1991, original fund was stopped, but nine foreign-language instructors obtained ¥2,000,000 ($15,300) from the Doshisha University Computer Research Fund for developing more permanent CBI foreign language programs. Also three English instructors with one CAI specialist obtained a ¥2,500,000 ($19,200) Doshisha University Research Fund grant for studying theoretical aspects of more effective English CBI. With these allocations and grants, the problem of budget was taken care of.

Use of Computers in English Language Teaching

In the TSS rooms, computer programming and some classes that use statistical analysis packages are offered. English CBI classes are different from other classes, since we use a computer, computer terminals and programs to assist students in studying English. In other words, computers are used to increase the effectiveness of the classes, and the students do not study computers or computer programs. At this point, only English and German CBI courses are using computers to assist learning.

The computer-based instruction (CBI) English grammar program opened in the fall of 1988 with a typing program and 44 students in three classes, though the maximum enrollment was 25 per class. At Doshisha University, staff members of the computer center cannot

be involved in teaching at all. They are not allowed to assist with programming, grading or anything related to the classes. They are responsible only for the maintenance of computers. Everything else, including programming and maintenance of software, is left to the users in either research or teaching. Academic Affairs assigns rooms and provides floppy diskettes. Several committees are responsible for different aspects of computer use and use of the TSS rooms. Sometimes each committee decides that a certain problem belongs to another committee. Moreover, instructors are not necessarily members of those committees, and many problems are never solved.

Commercial software for CBI classes was not available for Hitachi 2020 computers, and the staff of the computer center could not make programs for English CBI. However, we were fortunate enough to have two people who agreed to develop computer-assisted instruction (CAI) and computer-managed instruction (CMI) software for our computers and were able to get funding for those people. One of them was very familiar with BASIC language for the Hitachi 2020 for CAI and FORTRAN language with a Hitachi host computer for CMI, which are not necessarily well known to many programmers. We have worked continuously for three years to improve many programs and teaching materials. We have made some programs with C language, and some programs can be used by Hitachi 2020 or NEC 98 series computers. Now our CBI system can be used to study English using words (but not sound or visuals), to administer classes, and assist individual students in studying English more ef-

fectively.

Our CBI English language classes were first offered in 1988, and they have become more and more popular since then. A large crowd of students showed up for CBI enrollment orientation in 1989, more came in 1990, and even more in 1991. Seventy-nine students enrolled in 1989 (36 in two grammar classes and 43 in two reading classes). In 1990, we increased the number of teachers from three to four, and 108 students enrolled (50 in two grammar classes and 58 in three reading classes). In 1991, 127 students enrolled (50 in two grammar classes, 54 in three reading classes, and 23 in a writing class). One German CBI class opened in the fall. We are now preparing to increase CBI English classes to seven and CBI German classes to three next year.

Instructional Philosophy and Organization of English CBI at Doshisha University

Goals

The goals of developing CBI English courses are 1) teaching English with the assistance of computers, 2) allowing teachers and students who are not familiar with computers to carry out CBI classes, 3) teaching the same content and amount as regular English classes for sophomores, 4) using programmed instruction and giving individual counseling, 5) giving timely feedback to students so they can use it for further study, 6) emphasizing practice outside of the class, and 7) making students active in learning. The three original CBI

instructors agreed to these and use the same programs, but we decided to develop teaching materials for our class based on our instructional ideas.

Many teachers who use CAI to teach English seem to pay more attention to computers and programs than to the content of the English classes. We have tried to make use of the advantages of computers to try to teach English more effectively. In order to do so, we have made simple CAI programs and some teaching materials and tried to increase the effectiveness of English instruction. Before we can establish the best CBI classes, we need to consider multi-media CBI classes in which we can use pictures, photos, video and sound as well as words.

Outline of the Courses

Introducing CBI courses. We included English CBI courses such as grammar, reading, writing, listening and conversation as electives for sophomores. We published synopses of the CBI courses in enrollment guidebook. We also had a meeting right before the enrollment to explain CBI courses to students who were considering enrolling in them. The maximum enrollment in each CBI course was 25, and if more students wanted to enroll, they had to participate in a lottery. Except in 1988, when the computer was only used in the courses during the fall semester, our courses used the computer for the entire school year. As more teaching materials have been made, students have been able to use the computers outside class time for practice. Since there is no commercial materials for

Hitachi 2020 computers, we have used only teacher-made materials to avoid any copyright problems.

In our courses, students are not required to have any knowledge of computers or any typing skills. Anyone can take English CBI courses as they take other English courses. We give an orientation during the first two classes. We have made a B5-size 14-page manual for CBI courses, which has gone through many revisions. Using this manual, we can explain what the content of the class is, what the methods of study are, how evaluations are done, how to use computers, what the rules for using computers and the TSS rooms are, how typing is taught, and so on.

Preparation for the course—Instructors. Instructors need a minimum knowledge of computers, for example, how to use MS-Dos. There is a manual for instructors which explains what facilities are available, what instructions to give in the class, how to operate the computers, what programs are available, and how to make teaching materials. We also give an orientation to new teachers using the manual for instructors, so that they can understand how CBI classes work as well as how to give an orientation to their students. There are many things instructors have to know, and the manuals are very important. We have revised them many times, and they are well organized help teachers prepare for and conduct CBI classes most effectively. In our experience, making a good manual is very important for students and instructors. Using it and having a smooth beginning is half the success of the course.

Characteristics of materials. After the two-period orientation, stu-

dents continue to practice typing for another two periods. Then they practice with multiple-choice exercises, fill-in-the-blank exercises, error-correction exercises, or sentence completion exercises. Thus, exercises are graded according to the amount of typing they require students to do. Also students move from grammar exercises with little reading to reading exercises requiring more reading. I always give at least three different types of readings or exercises in order to provide some variety.

Materials are grouped according to the purpose and type of exercise. Students practice them in order to acquire certain skills and content based on the programmed instruction. After I made many materials, it is not easy to know how well each student is doing on each question, so I made achievement tests using some questions from the exercises. Thus, using the results of the achievement tests, I can estimate how well they have learned. Analyzing the results with grading, item analysis and error listing programs (CMI), I can give advice to individual students.

After students finish an exercise, they see the number of questions, how many correct answers they gave for the first and second tries, the percentage of correct answers, and time students required to finish. They write down the records on recording sheets. They are given the class average, and they can compare their results to it. They can also compare their previous results on similar exercises. In this way, they are informed of how well they are doing. They also receive some information from me about how well they are doing and how they could do better in the future. In CBI courses,

students get much more information to help them improve than in regular English classes.

I am making exercises for some standardized English exams, such as STEP, TOEFL, and TOEIC. Those are made to allow students to study by themselves with the tutorial, that is, students are given some information to study and then practice exercises. Clear instructions are given that allow students to study independently.

We have a file called a bulletin board in the computer all the time. Thus students can see instructions on what to do and how to do it, and the due date. I can give messages even outside the class in this way. They see the class results or assignments on this bulletin board.

Dealing with variations. Since students have studied English for at least seven years before these courses, their English proficiency varied a great deal. The time required to finish exercises varied even more. Therefore I have been making intermediate and elementary level materials, with differences in difficulty being based in part on the type of exercise. This allows the same passage to be used by students with different levels of proficiency by using different exercises. I have also made extra materials for advanced students to use.

Facilities and Equipment

On the Tanabe campus, there is a Hitachi host computer, 80 Hitachi 2020 terminals in two rooms with a movable wall, and 85

lap-top Hitachi computers in another room. The Hitachi 2020 and lap-top computers are terminals to the host computer, but with connection to the host computer, they can be used as personal computers with a 10 or 20 mega bite hard disk.

Our CAI system works only with the Hitachi 2020. The Hitachi 2020 can process letters and graphics, but not photos, videos, or sound. It works as a 16 bit personal computer, but for someone accustomed to a modern personal computer, they feel it is very slow. Since all Hitachi 2020s are connected to the host computer, using a program developed by staff members of the computer center, an instructor can transfer all programs and teaching materials from his or her terminal to the host computer and students can transfer them from the host computer to their terminals. Students can also transfer their answer files from their terminals to the host computer. All of these operations were very easy. However, if all the students transfer files at the same time, it takes a few minutes, and also if students are transferring files, the instructor cannot transfer a file.

The instructor can show his or her screen on the large projector, and also see the answer files students have finished. However the instructor cannot see a student's screen or show it on the large projector. Thus the Hitachi 2020s are not networked.

Even though the terminals are maintained by staff members of the computer center, we sometimes find problems with the terminals. Also, when advanced students have used the terminals in special ways without returning them to normal settings, students may find some problems with their terminals. In this case, we have to get

assistance from staff members of the center.

Programs

Based on our analyses of student responses to the materials and exercises developed, as well as their needs and interests, CAI and CMI software programs have been revised many times over the years.

CAI Programs

We have made more than twenty CAI programs, but there now are three main types: a typing program and two types of programs that use multiple-choice questions and write-in questions (fill-in-the-blank, complete-the-sentence, etc.).

The principle of those three programs are the same. On the first screen, all programs can present the number of questions, the maximum time allowed to finish, the minimum score required, and how many times the file must be repeated if the student does not meet the time or accuracy requirements. Except on the typing program, the screen can also show whether hints and correct answers are provided. Then they present instructions and examples before the questions are displayed. The computer checks student answers against the answer(s) provided by the teacher. If they match, students see "very good" on the screen and go on to the next question. If the answer is wrong, hints are offered and the student answers again. If the answer is still wrong, the computer presents the correct answer(s) and the student goes on to the next question. At

the end of the file, students get a summary of their results: how many questions there were, how many were answered correctly, the percentage of correct answers for the first and second tries, and the total time spent doing the program.

The programs using write-in questions can be used for multiple questions, but we cannot run the item-analysis program with the answers. By changing the teaching materials, we can run fill-in-the-blank, sentence completion, error correction, changing the order, or anything in writing.

As mentioned above, computers can be programmed with a maximum time students can spend finishing a file and a minimum score they must achieve. If students do not meet the specified requirements, they have to do the file again from the beginning.

For reading, we can specify the time students are allowed to spend reading the passage. If we specify a certain time, students have to spend that amount of time reading the passage and cannot go further until that amount of time has passed.

We also have programs for testing, which allow students to go backward and forward, changing their answers. The students are not given any hints or correct answers while they are working. When they finish, they get the same summary on the screen.

These programs show the number of questions, the maximum time, the minimum score, and how many tries are allowed at the upper left corner. They also show which program, which file and which question the student is working on in the upper right-hand corner. Students can see whether they are working within the time

limit, and the instructor can tell which material the student is working on.

The newest development is programs on which students can change the specifications, including the maximum time allowed, the minimum score required, how many times the file must be repeated if the requirements are not met, and whether hints and correct answers are provided. These programs are developed for student self study.

After students get the feedback screen, they are asked whether they want the answer file sent to the host computer. If they type "Y", they send the file, and they cannot send the answer file again even if they do it again.

CMI Programs

We have also developed four major CMI programs. We can get lists of the dates and times students work, the number of questions, the amount of time they spent, their scores for the first and second trials, their percentage correct and the number of times students worked on the files, arranged according to the ID numbers of the students, from highest to lowest score and from shortest to longest time spent. We can also get a list of the students who did not work on the file. We also have an item analysis program, and a program which lists all the errors for individual students or individual questions. In addition, we have a program which sums up the results of files and shows the total scores, percentage and time. They are also sorted by score and time and show the list of files missing.

An instructor can use the CMI programs to show the results on

the screen or in printouts. Using these programs, he or she can see how well the class is doing, individual students' problems, and difficulty level of each question. He or she can give feedback to the class and individual students.

Teaching Materials[4]

I have developed many exercises, including materials to develop typing, grammar, reading, writing, and vocabulary skills and knowledge about culture. I developed about 700 files made up of about 13,000 questions by the end of November, 1991. I have been developing tutorial materials as well as drills. Based on student responses, I am making elementary, intermediate and advanced level materials and some TOEIC and TOEFL exercises which students can work on by themselves.

I have also made tests for the orientation and some printed materials

4 Teaching materials mentioned in this paper do not include any materials developed by other instructors. Some of them are published. They are the following.

Kitao, K. & Kitao, S. K. (1986). *American potluck*. Tokyo: Asahi Press.
Kitao, S. K. & Kitao, K. (1988). *Writing English paragraphs*. Tokyo: Eichosha.
Kitao, K. & Kitao, S. K. (1989). *Colonial days*. Tokyo: Gaku Shobo.
Kitao, S. K. & Kitao, K. (1989). *American panorama*. Tokyo: Asahi Press.
Kitao, K. et al. (1989). *Holidays in the United States*. Tokyo: Eichosha.
Kitao, S. K. & Kitao, K. (1990). *Understanding English paragraphs*. Tokyo: Eichosha.
Kitao, S. K. & Kitao, K. (1990). *American patchwork*. Tokyo: Asahi Press.
Kitao, S. K. & Kitao, K. (1991). *American portrait*. Tokyo: Asahi Press.
Kitao, K. & Kitao, S. K. (1991). *TOEIC no eibunpo (jo kan)* [*English grammar for TOEIC (Vol. 1)*]. Tokyo: UNICOM.
Kitao, K. & Kitao, S. K. (1991). *TOEIC no eibunpo (ge kan)* [*English grammar for TOEIC Vol. 2)*]. Tokyo: UNICOM.

List of CAI Teaching Materials (November, 1991)

Content	Type	Files	Questions
Typing	W	82	4,950
Typing & Grammar	W (sentences)	15	450
Typing & Grammar	W (words)	15	450
total		30	900
Grammar			
TOEFL	C	7	320
TOEFL	W (words)	7	320
TOEFL	W (errors)	12	320
general	C	5	240
sentences	C	3	115
combining sentences	C	5	153
combining sentences	W (words)	5	157
common mistakes for Japanese	W	8	240
TOEIC & STEP 1st class	C	12	500
TOEIC grammar	C	35	780
total		99	3,145
Reading			
understanding paragraphs	W (figures & words)	58	1,286
reading paragraphs	W (words)	122	686
reading paragraphs	W (sentences)	122	686
Japan-US comparison	W (words)	18	167
Visiting Western Europe	W (sentences)	7	50
Visiting Western Europe	W (words)	7	50
Colonial Days	W (sentences)	25	255
Colonial Days	W (words)	25	255
reading test G	C	5	30
reading test H	C	5	30
Nonverbal Communication	W (sentences)	7	48
Nonverbal Communication	W (words)	7	48
Nonverbal Communication	W (blanks & sentence)	7	104
Kenji Goes to the US	W (sentences)	5	62
Kenji Goes to the US	W (words)	5	62
Holidays in the US	C	16	111
Holidays in the US	W (words)	16	111
Holidays in the US	W (symbol & sentence)	16	221
American History	C	16	194
American History	W (words)	16	194
American History	W (symbol)	16	190
total		521	4,840
Writing			
paragraphs	W (word, figure, sentence)	25	667
Vocabulary			
meaning in the context	C	1	30
loan words	C	1	20
STEP	C	2	100
total		4	150
Culture			
Test of American Culture	C	1	100

C (multiple-choice); W (write-in)

which we use for the class. These CAI materials were used to check how well students had understood the orientation or materials they had studied by themselves.

Except for 35 files of TOEIC grammar instruction and exercises, all files, including instructions, questions, exercises and hints, are written in English. In this way students can be exposed to English and learn more English. It will help them establish the habit of thinking in English.

Typing Materials

There are many typing materials. Students learn home position to habitualize their finger movements. They practice the right hand, left hand, and both hands on the middle row, then the second row, bottom row, and the top row. They practice with combinations of letters at the beginning, then nonsense words, and, as soon as possible, real English words.

Materials that combine typing and grammar require students to not for only copy the letters or words that appear on the screen but to work on very easy grammar exercises and type whole sentences.

Grammar Exercises

There are three main types of grammar exercises: multiple-choice, fill-in-the-blank and error correction. I made the multiple-choice questions first and then revised them into fill-in-the-blank, and then error correction exercises. I found that if there are two errors in the error correction exercises, they are too difficult, and students

become too frustrated. With the programs we have, I can make exercises to correct scrambled sentences, to complete sentences, write sentences, etc. I made many questions for STEP, TOEFL, and TOEIC. I made sentence combining questions, but they are too difficult. However, students found multiple-choice questions much easier. I also collected a list of mistakes Japanese often make and made questions based on these. They are very difficult for students, and I had to use good hints.

Reading Materials

Many of the reading materials are concerned with teaching students about paragraphs. "Understanding English Paragraphs" is a set of materials intended to help students understand the construction, characteristics and important aspects of paragraphs. "Reading Paragraphs" is a set of materials that requires students to read paragraphs and answer comprehension questions. The "Japan–US Culture Comparison Series" deals with differences in manners and customs and are similar to "Reading Paragraphs." It is a series of readings, with topics including "Nonverbal Communication," "Holidays in the United States," "American History," "Kenji Goes to the United States," "Colonial Days," and "Visiting Western Europe."

Writing Materials

For writing exercises, I have made some materials such as "Writing English Paragraphs" to help students understand the construction

and content of paragraphs, the writing of topic sentences and connecting sentences, etc.

Vocabulary Exercises

In order to help students increase their vocabulary, I have made materials to train students to guess the meanings of unfamiliar words in context. I have also made vocabulary exercises for the STEP test and exercises using Japanese words borrowed from English.

Desirable Characteristics for Materials

Based on three years of experience with CBI English classes, I have found that instructions, questions and exercises have to be very easy to understand, clear, and simple. If they are not, students get confused or misunderstand what to do, and the exercises will not be effective in helping them learn. All exercises should have some examples.

All the exercises are much easier than I think they should be. However, the results are much worse than I expected. It is likely that I overestimated their English proficiency. According to Skinner's (1954) theory of reinforcement, an 80% correct response or better is good for studying. The exercises should be much, much easier than instructors think, and there should be many exercises. Each question should have only one main point, and students should not be expected to do many things on one question. I once made error-correction questions with two errors in each item. Students' results were very bad, and they were very frustrated with their inability to

answer the questions correctly.

Teaching materials have to follow the minimal step order principle, that is, each question is slightly more difficult than the previous one, but not too much. Students do the questions in order, and they can understand the each question based on what they learned from previous questions. It is also important to have some variety of work to do. Combining materials to follow the program and have variety is very important. This programming for each student is very crucial in making CBI courses successful.

Difficulties in Making Materials

Making CBI materials is very time consuming. It requires at least two hours and up to fifteen hours to develop a file that students spend 10–20 minutes on. Therefore it is important to find efficient ways to make materials, such as making multiple-choice questions, then converting them to fill-in-the-blank questions, and then to error-correction questions. Another way is making different versions of the same file, with different blanks, errors, etc., which make some questions easier or more difficult. For reading materials, even using the same passage, it is possible to make different levels of difficulty questions.

In making materials, it is important to revise questions many times, based on student responses. They often respond very differently from what we expect, because of poor directions, difficult questions, etc.

Many CBI materials have to be prepared and stored for use ac-

cording to students' interests and abilities. In order to choose good materials for individual students, we need a good manual to describe the content and level of English of different materials, and if possible previous results. Thus instructors can choose the best material for each student. It is possible to give a diagnostic test at the beginning, and, based on the results, choose the best material. CBI classes can provide such individualized instruction, and this is one of the biggest advantages of CBI.

Students' Responses

Students have responded CBI classes very well. They liked typing in particular, because they can be very successful and can see their progress. They get 90% or even 95% correct on the first trial. Their typing speed improves greatly. Students like multiple-choice questions as well, since this type of question is easy to work on, and students can get about 70% correct on the first trial. However, they become frustrated with write-in questions if the questions are too difficult. If they cannot get over 50% correct on the first trial or if they have to spend more than 30 minutes on a file, some students give up.

Compared with other English classes, students are required to be more active in learning in CBI English classes, because they have to finish all the assigned tasks by themselves. If they are given a lot of work, they have to work hard in order to finish as much as possible in the classroom, because they have to finish whatever they have not

done as homework. However, if they are given too much, some will give up. If the maximum time and minimum score that are specified are too stringent, some students will give up. It is very important to choose an appropriate amount of work and set appropriate goals for students.

Because students can clearly see how well they are doing in CBI classes, they can determine their goals and study to meet those goals. Students study more actively for CBI classes than regular English classes.

CBI classes are very different from other English classes. Students experience a different style of studying. Many students are interested in CBI classes, and every year more students come to explanation meetings before the enrollment. More students enroll in CBI English classes, and they seem to be satisfied with them.

Advantages and Disadvantages of CBI

Advantages

For students. One major advantage of CBI is that students actively respond and study using a computer. In many regular English classes, students sit passively in the classroom during classes. However, in a CBI class, students have to do their own work by themselves as quickly and accurately as possible. They have to pay attention to whatever they are doing.

CBI requires students to study actively. They get immediate feedback whenever they work, which they can use for further study.

They also get a summary of the work at the end of each file. They are required to keep records, which makes them more responsible for their work and helps them gauge their progress. Also, because class averages for all files are posted in the computer, students can see how they are doing compared to their classmates.

Students can process much more material in CBI classes than in regular classes. They study much more. They cover several times as much material in my CBI classes than in ordinary English classes. Since almost all the materials I made give instruction, questions, hints, answers, etc., in English, students are exposed to a great deal more English than they are in some other English classes. They can improve their English greatly and come to think in English unconsciously.

Through the experience of working on CBI materials, students learn to pay close attention to spelling, because the computer accepts only accurately spelled answers. Students had not done much writing before participating in these CBI classes, and no one has closely checked their spelling.

Computers make monotonous work more exciting. Students show more interest in even simple exercises if they are doing them on a computer. As a matter of fact, I was surprised to find that students were so fond of typing exercises. They can do a great deal in English, and their performance of English improves.

For instructors. CAI allows instructors to see how well students are doing. The instructors can also see how seriously students are working. Students and teachers can consult on the student's pro-

gress using the results sorted by score and time, so instructors can help students individually using the data on the student's work.

The information provided by CMI programs can also let instructors know what problems are common. The instructors can concentrate on common problems that many students have and improve teaching materials easily.

We have been developing CBI English programs for a long time and have achieved certain goals regarding teaching basic content and skills using only characters. However, our students' needs, interests, and abilities are quite varied, so we need to do further work on individualized instruction and with sound and visuals.

Disadvantages

Machines. All machines have limitations. The Hitachi 2020 can process only characters, but not sound or visuals such as photos or videos. The screen can show only a limited amount of information, and the speed is rather slow. However, many textbooks have only text, and flipping pages takes almost as much time as changing screens.

Students have to learn to use machines. If we teach how to do it well enough in the orientation, there will not be a great many problems in the class, but if not, there will be too many problems.

Machines, of course, sometimes have problems. Misusing them can cause problems. CBI classes have potential of more problems. If computers are designed for CBI English courses only, and not for other programming courses, we can limit the possibilities of the

machines and avoid certain problems. Also we can consider using sound and visual systems in the classroom for language teaching. We need a technician to assist students and instructors with solving machine problems.

Programs. Both CAI and CMI programs were made by outside people. If we need to change them radically or even set up for each class at the beginning of the school year, we have to ask the technicians to do so; we cannot do them ourselves at this time.

Making operation as simple as possible is very important to increasing the effectiveness of CBI. If operating a computer is complicated, it may hinder students' learning.

For writing classes, we need to use a word processor programs, but the Hitachi 2020 cannot use any commercial programs for that purpose now.

Materials. Good CAI materials are not easy to make. Decisions about how to arrange the screen, how long to show each screen, what colors to use, etc., are not easy for amateurs. In addition, making materials is time-consuming. Revising materials based on students' responses also requires a great deal of time.

Facilities. Since students have to use TSS rooms, there are some limitations on students' use of the terminals. Students can use terminals only when the rooms are not being used for some other purpose. Some students do not have find any time to study except at lunch time. We are negotiating to move some classes from the TSS rooms to the lap-top computer room, and/or to extend the closing time of the TSS rooms to 6 o'clock every day, so that our students can

practice more outside the class.

The Hitachi 2020 is a desktop terminal, and they are lined up as in ordinary classrooms. Students cannot see the blackboard well, and the instructor cannot see students' faces well. They cannot take notes well, either. If computers were placed around the edge of the room, students could turn around and see the instructor well, and they could also get together easily to work together. Instructors would not need to move around much to assist students.

Students have to pay ¥2,000 for the use of the computer. It is not expensive judging from the amount of time they spend using computers, but it is an extra expenditure.

Preparation. Instructors have to spend a lot of time preparing for classes. They have to transfer all materials before classes. They have to transfer all answer files, do statistical analyses, and erase files. They have to spend a lot of time and energy on such clerical work, and they cannot spend much time consulting with students. If we individualize classes more, instructors will need even more time for handling files. Instructors definitely need assistants for CBI classes.

Administration. Administration of computers and the TSS rooms is very complicated, and it is under many committees on which we do not have representatives. It would be ideal for teachers running CBI language courses to have their own rooms and computers with staff members to administer based on the purposes of language instruction.

Future CBI Classes

Multi-media CAI technology is becoming more available, and in the near future, we need computers that can process visuals and sound. We will use CD-ROM for image scanners and sound, video floppies, and video discs for visuals. We will be able to use them to put sound and visuals into computers or connect computers with them to use sound and visuals outside of computers. Using sound, students will be able to record their voices and compare their pronunciation with models. These will be language laboratories with computers, and we need to consider future language laboratories, which are out of date at Doshisha University.

We need a system where all computers are connected and the teacher can monitor students' screens or students can monitor each others' screens. This would be very useful in a writing course. It would allow the teacher to project one student's screen on the screens of other students and discuss it in class.

For CMI, we need to speed up the process and also find a method to project the results to the students as quickly as possible. Right now, our system is working effectively, but it takes time to show the results to the students. We also need to consider how to avoid using so much paper.

We need to increase the choice of materials available for use in class or by individual students. We also need to make a manual for each series of material, explaining the purpose, content, language items covered, difficulty level, previous results, etc. This would allow the instructor to use materials effectively to meet the needs

and interests of the students. We also need diagnostic materials to pinpoint students' weakness. We need to continue our research on the difficulty levels of materials, so that we can set appropriate maximum time and minimum scores for specific students. We also need to label advanced, intermediate and elementary level materials.

We also need to improve the manual for instructors. In addition, we need to improve the orientation at the beginning of the course and the manual used for it.

At our university, we do not have much experience with programmed instruction or individualized instruction. We need to continue to carry out research to investigate more effective methods of instruction using computers.

Conclusion

I have discussed effective CBI courses, based on my study and experience with CBI English courses. I would like to emphasize that CBI can be effective for not only language instruction but any courses or training, even outside schools. As a matter of fact, this can be a very powerful learning tool for individuals or groups at home, in the classroom or in companies. However, if computers are used without a knowledge of both their strengths and weaknesses, they will waste learners' time and effort and may even be harmful. We need to continue to find out what facilities and equipment should be used, what programs and teaching materials should be provided, how to give feedback to learners, how to administer classes and CBI

rooms, how CBI could make use of multi-media technology, and what else should be done in order to make CBI more powerful and effective. In order to improve CBI, we need cooperation among people from different backgrounds who are interested in CBI.

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